

XVI. TEMNOCEPHALIDAE.

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(Plate xiv).

The only representative of this family found by the Abor Expedition was *Temnocephala semperi*, Weber. This species was first found by Semper on crabs in Luzon and Mindanao, from the plains up to an altitude of 5000 ft. (1872, p. 307). It has since proved to have a wide distribution in the Oriental Region; for according to Max Weber, who first described it as a distinct species (1890), it occurs on "*Telphusa*"¹ spp. in Sumatra.² Java and various parts of Celebes and it has been found both by Dr. Annandale and by myself in the Dawna Hills of Tenasserim, where it occurs on *Potamon manii* and probably also on *P. andersonianum*. Specimens in the Indian Museum collection of *P. manii* from Tavoy, and of *P. andersonianum* from Yunnan and from the Sheetee (Kakhyen) and Manipur Hills, bear eggs closely resembling those evidently belonging to this species on crabs from the Abor country and Dawna Hills. In the Abor country it is not uncommon on *Potamon adiatretum* and *P. superciliosum*,³ and in the absence of any record of another species of *Temnocephala* from Asia, it is probable that the specimen found by Wood-Mason in a bottle of fish from the Dafla Hills (1875, p. 337) was also *T. semperi*, and had become associated with the fish accidentally. Mr. Kemp, it may be pointed out, was unable to find any kind of *Temnocephala* on fish in the Abor country, which adjoins the Daflas, although he was looking for confirmation of this record. The Abor and Dawna records are as follows:—

Abor Country: Yembung River, 1100 ft., 13-i—9-ii-12.

Lalek stream between Renging and Rotung,
10-i-12.

Below Damda, banks of Siyom River, 1-ii-12.

Dawna Hills: Third Camp, western base of hills, ca. 400 ft.,
30-xi-11.

Misty Hollow, western side of hills ca. 2200
ft., 29-xi-11.

¹ *i.e.* *Potamon* of recent monographs.

² I have to thank Prof. Max Weber for sending me some of his specimens from Sumatra for comparison with the Burmese and Abor specimens, the identification of which they have greatly facilitated. I have also to thank Dr. J. H. Ashworth for specimens of other species with which to compare these.

³ A new species shortly to be described by Mr. Kemp in this volume.

Sukli, eastern side of hills, ca. 2100 ft., 22—29-
XI-II.

Below Sukli, ca. 1500 ft.

The habits of *Temnocephala semperi* seem to be very like those of other species of the genus. My observations on Burmese specimens were very hurried, but, so far as they go, they confirm Mr. Kemp's on Abor ones. The following account is based on these.

The creatures are extremely contractile and their great activity is most striking—indeed it is apt to be startling the first time living specimens are seen. They live, often in large numbers, on the lower surface of the body and among the basal joints of the legs of their host, which is apparently always a crab of the genus *Potamon*, and of the subgenus *Potamon* or *Geotelphusa*. *Temnocephala* has not so far been found on specimens of *Potamicus*, the only other subgenus of *Potamon* found in India, possibly on account of the fact that the members of this subgenus are less aquatic in their habits. When the animal is quiescent, its median tentacle is extended directly forwards, the intermediate tentacles are elevated, and the posterior ones are depressed. As a rule the last-named tentacles do not assist in progression but remain outstretched and curved slightly forwards, while the tips of the other three are applied to the ground. The body is then hunched up and pressed forwards till these three tentacles lie entirely beneath it, after which the posterior sucker lets go its hold to find a new one further forwards; then the same process is repeated.

When separated from its host, *T. semperi* stands and waves its tentacles around, as though trying to perceive a new one, or crawls rapidly about. Occasionally, when it is greatly irritated, the tentacles are doubled back and tucked away beneath the concave ventral surface of the body.

Haswell (1888, p. 283) found that the food of Australian *Temnocephalidae* consisted of small crustacea and insect larvae. In the specimens examined from the Dawna Hills, remains of the latter are abundant, of the former very rare. The Abor specimens do not throw much light on the nature of the food, but one contains a lot of diatoms and other matter, so arranged as to leave little doubt that they were introduced in the gut of some other animal, perhaps an aquatic Oligochaet.

The animal as a whole is white and semi-translucent in life, with the stomach showing through as a yellowish patch a little behind the single pair of small black eyes. I have nothing to add to our present knowledge of the general anatomy of the animal, though I can confirm from sections the results of both Weber's and Merton's investigations of the species; but the chitinous lining of the penis appears, on account of its special importance in taxonomy, to be worthy of greater attention than has been bestowed upon it in any paper I have yet seen.

This cuticle is most readily examined in detail after the animal has been treated with hot caustic potash and then crushed

and triturated under a cover-slip till the tissues have been disintegrated; but when a number of specimens of different sizes are to be compared together, I have found it more convenient to mount them whole under simple pressure, after the preliminary treatment with potash. As boiling with potash rapidly disintegrates the animal and usually results in the loss of the penis, the plan adopted has been to pour boiling 5% caustic potash solution on to the specimens, which then in a few minutes become clear without falling to pieces.

Haswell has pointed out that in several species of *Temnocephala* two distinct regions can be recognized in the penis (1887, p. 296). This is so in *T. semperi* as has already been noticed by Semper (1872, pl. xxiii, fig. 7) and Weber (1890, pl. i, fig. 1). In the proximal region the chitin is smooth, whereas in the distal region or glans it is armed internally with fine, close-set spines (fig. 6). In the smallest specimens of *T. semperi* that I have seen, the proximal region is very little longer than the distal (fig. 7), but as the animal grows the former becomes more rapidly enlarged than the latter, so that in approximately full-grown specimens the chitinous lining comes to have the form shown in fig. 5. Finally, in a few specimens from the Dawna Hills, all of them full-grown, the whole organ has become very much longer and slenderer, as is shown in fig. 4.

Temnocephala semperi lays its eggs on the sides of the femora, and occasionally on the abdominal terga and the sides of the carapace, of its host. They are very like those of *T. fasciata* figured by Haswell (1887, pl. xxii, fig. 18). They vary greatly in size, being from about 0.5-1.0 mm. in length, and two or three times as long as broad. They are covered with a hard brown shell, from a little towards one end of which arises a thin (? chitinous) thread, that is commonly broken during the preservation of the specimens. The animal appears to develop inside the egg with its tentacles bent along the body as in *T. madagascariensis* (Vayssiere, 1891, pl. i, fig. 6).

Although *Temnocephala semperi* is the only species of its group of which adults were obtained in the course of the Abor Expedition, there is some evidence that another occurs at the base of the Abor Hills. Dr. Annandale, while examining specimens of a race of the Atyid prawn *Caridina weberi* from the Assam-Bhutan frontier, noticed in their gill-chambers eggs in every respect similar to those of the peculiar little Temnocephaloid recently described by him as *Caridinicola indica* (1912). In one egg the shell had been ruptured and a young *Caridinicola* was protruding from it. In the gill-chamber of a specimen of the same prawn taken at Dibrugarh by Mr. Kemp, Dr. Annandale found other eggs which differed in their smaller size and in being apparently devoid of a coloured shell. It is therefore probable that *Caridinicola* or an allied animal lives on Atyid prawns that inhabit the streams of north-eastern Assam.

LIST OF LITERATURE REFERRED TO.

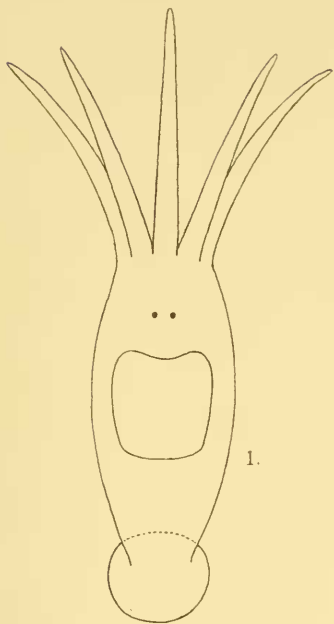
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EXPLANATION OF PLATE XIV.

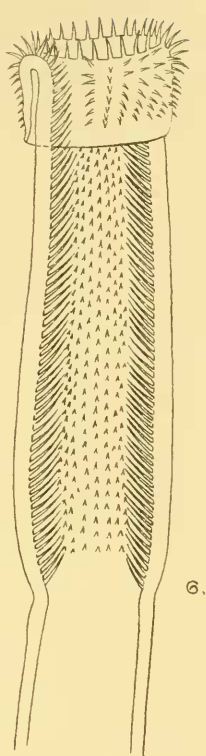
Temnocephala semperi.

- FIG. 1.¹— A specimen fully expanded, from above, much magnified.
- „ 2.¹— A specimen attached by three tentacles and the sucker, in the act of progression, much magnified.
- „ 3. — A preserved full-grown specimen, much contracted, showing the position of the elongated penis and principal organs, $\times 30$.
- „ 4. — Penis of a similar specimen, $\times 210$.
- „ 5. — Penis of a normal full-grown specimen, $\times 210$.
- „ 6. — Distal portion of penis of the same specimen, $\times 1080$.
- „ 7. — Penis of a very young specimen, $\times 210$.

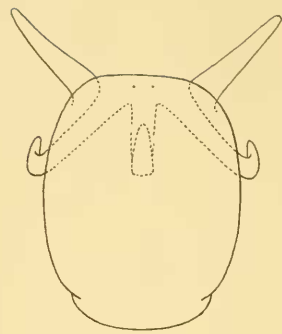
¹ I am indebted to Mr. Kemp for these two figures.



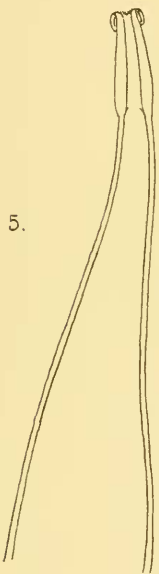
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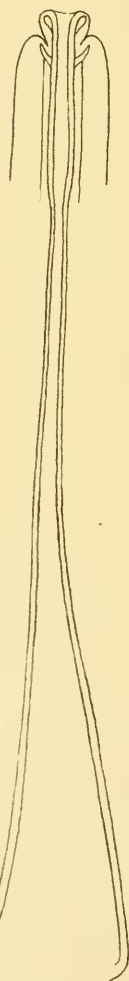
6.



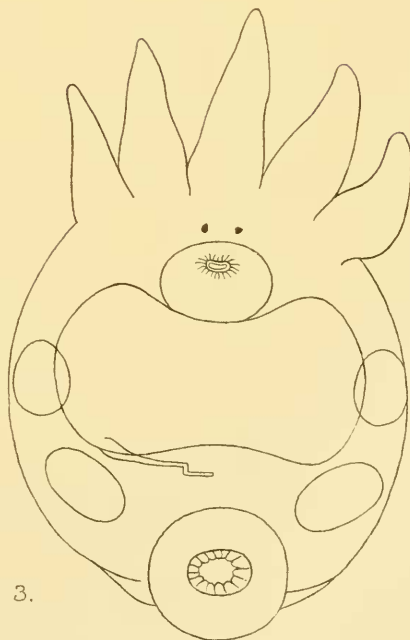
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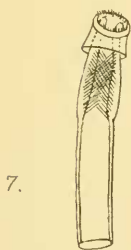
5.



4.



3.



7.

D. Bagchi, del.

A. Chowdhary, lith.

TEMNOCEPHALA SEMPERI, Weber.